

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
14 July 2005 (14.07.2005)

PCT

(10) International Publication Number
WO 2005/063362 A1

(51) International Patent Classification⁷: **B01D 53/22**,
C01B 21/04, 13/02, B01D 63/02, 63/10

(21) International Application Number:
PCT/GB2004/005415

(22) International Filing Date:
23 December 2004 (23.12.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0330257.7 31 December 2003 (31.12.2003) GB

(71) Applicant (for all designated States except US): **SMART-MEMBRANE CORP** [BS/BS]; 3rd Floor, Trade Winds Building, Bay Street, PO Box N-7823, Nassau (BS).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **MCNEIL, John**

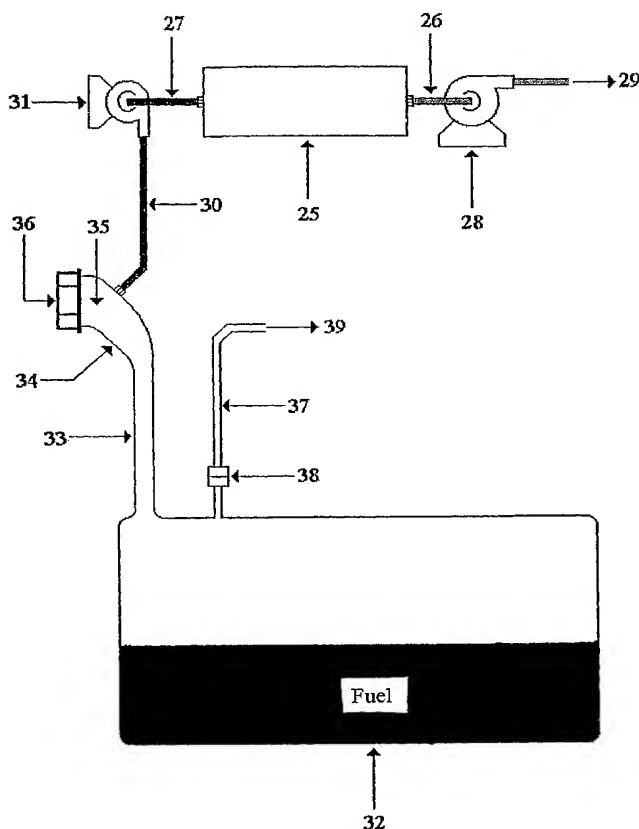
[GB/GB]; 1 The Gallops, Vigo Village, Meopham, Gravesend, Kent DA13 0SS (GB). **VAN DEN GROSS, Andrew** [RU/GB]; Sittingbourne Analytical Laboratory, 955 Cornforth Drive, Sittingbourne Research Centre, Sittingbourne, Kent ME9 8PX (GB). **LYONS, Arthur** [RU/GB]; Sittingbourne Analytical Laboratory, 955 Cornforth Drive, Sittingbourne Research Centre, Sittingbourne, Kent ME9 8PX (GB).

(74) Agent: **FRANK B. DEHN & CO.**; 179 Queen Victoria Street, London ECV4 4EL (GB).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,

[Continued on next page]

(54) Title: METHOD AND APPARATUS FOR SEPARATING AIR



(57) Abstract: A gas separation module (25) is disclosed for separating air into nitrogen (27) and oxygen (26) enriched fractions. The nitrogen enriched fraction 27 may be used to inert an atmosphere inside a fuel tank (32). The air is separated into nitrogen (27) and oxygen (26) enriched fractions by providing a plurality of strands of gas separation membrane wound around a core and maintaining a pressure difference across the walls of the strands of membrane. A low pressure difference of ≤ 30 psi maintained across the membrane is able to effect gas separation and provide highly nitrogen enriched air. The membrane has preferably been subjected to a modification technique to increase its gas permeability.

WO 2005/063362 A1



TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO,

Published:

— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.